

Beach Nourishment Performance - A Private Sector Perspective

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Introduction

Over the last 28 years I have enjoyed working on many beach nourishment projects on the east coast of the United States with many projects in Florida and some large ones in New Jersey. About half of those projects have been Federal projects and others being locally funded. I have had the privilege of working with a number of excellent scientists, engineers, and administrators in the Corps of Engineers who have demonstrated a dedication to getting very difficult jobs completed in the face of what appeared at the time to be insurmountable odds. Each time the Corps personnel found a way to get the job done and to do it well.

A few years ago I served on the National Research Council committee on beach nourishment and some of my comments will relate to the interaction of the scientists on that team and my observations and review of the nationwide program.

I offer the following comments to detail the truths about the U.S. beach nourishment program as I understand them. If some comments seem critical, it is in an attempt to make you aware of areas in the program that could and should be improved or would benefit from being looked at in a different way. I will focus my comments on beach performance and how that relates to ongoing programs.

Monitoring Performance and Public Perception of the U.S. Beach Nourishment Program:
"You can't fool Mother Nature," says my Uncle Bill as he echoes the widely held public perception of beach nourishment being an expensive and useless exercise.

Contrary to the conventional wisdom espoused by Uncle Bill however, the overwhelming majority of U.S. beach nourishment programs throughout the country are resounding successes by any measure of performance. While some of these nourishments did not do well when they were first built, they have all been progressively improved and are now out performing original long-term projections. Why doesn't the public know this?

The public perception of a project is often formed with the performance of the first project and sometimes even before that. Critics who get a lot of press can establish the public perception before the project is built; even when the nourishment subsequently performs well the public perception is slow to change and sometimes never does. The fact that the beach nourishment is doing well after a couple of nourishments almost never makes the national press.

As engineers, it is important to both monitor the beach and to analyze and publish the monitoring results in some meaningful way. That includes comparing dry beach area with expected or designed area and computing and reporting total volume remaining as compared to the designer's and maybe the critic's projections.

While monitoring is sometimes done on Federal nourishments, a full reporting of results often gets lost in the process and is almost never produced in laymen terms. Our attitude seems to be that we do not have to answer the ramblings of the pseudo-scientifically misinformed because the public can easily see how wrong they were. I am not sure that the public is paying that close of attention.

A recurring challenge in our field is to demonstrate to the public, and hence, the administration and congress, that funds are being spent wisely. Study after study shows this to be true, but these results are almost always received with skepticism because of the conventional wisdom about beach nourishment.

We will not turn the tide of public opinion and acceptance until we show the results of long-term monitoring in a way that the public can understand. And when we develop effective ways to inform the public, we need to keep doing it over and over and over until the conventional wisdom reflects the truth about beach nourishment performance and cost effectiveness.

Beach Nourishment Design and Performance

The design process has steadily evolved on many fronts and has definitely improved in the past few years. The use of numerical models to predict performance has become a standard part of the design process. Over the long term, computer models may pay big dividends, but in the short term, they need to be used with caution. Until models can provide consistent and believable answers, we cannot and should not depend on the results to design our beach nourishment projects.

We need to develop a safety factor for each aspect of our design process similar to what exists in structural engineering. With the level of uncertainty of coastal storms, littoral drift quantities, and direction and erosion rates, it is amazing that optimized project designs have performed as well as they have. Designing a wider beach to account for risk and uncertainty will still produce a strong positive net benefit in all of the Federal projects that I know of. The beach with a safety factor will perform better overall and increase public confidence in the coastal engineering design process.

We should redesign beach renourishments to correct hot spot erosion problems. Where adequate borrow sands exist, hot spot erosion areas can and should be overfilled in the renourishment to account for the higher erosion rate of the hot spot areas. Sand lost from hot spot areas in many cases builds up in other project areas increasing project benefits. Recognize that this procedure will result in the use of more sand than originally intended but higher long-term project benefits.

If, however, we allow hot spot erosion areas to be chronic problems, the projects will realize fewer benefits than were originally estimated and public perception of the project could be damaged. If hot spots cannot be controlled with fill only, than surgical use of structures should be considered at the hot spot if the net benefits (not just lower cost) of the structural solution exceed that of the fill solution.

Sea sleds should be required for beach monitoring surveys in lieu of fathometer surveys. While there have been improvements in the use of fathometer surveys, the error in the offshore readings often creates a significant volumetric error that masks the actual change in volume. The use of a sea sled can almost eliminate offshore measurement error and produce consistent results to improve project design.

The concept of overfill as a method to evaluate required sand quantities should be replaced by sand performance analysis. The equilibrium profile can predict the amount of sand needed to form the required dry beach area. Likewise, storm recession models consider grain size when computing the retreat of the profile during storms. Finally long-shore littoral drift and erosion rates can be adjusted to consider grain size. When all three fill performance parameters have been properly considered in the design the use of the overfill factor would be redundant. This redundancy should not be eliminated, however, until safety factors are added the design process.